Clark differs from the method employed by those who are reporting numerous cases of papilloma treated with the hot spark from high-frequency coils which they term "fulguration." They are not using the desiccation method as described by Dr. Clark. That method should be called *destructive* fulguration, in contradistinction to the method of de Keating-Hart which was demonstrated in this country last winter, and the results of which are being carefully investigated in New York. Dr. Clark produces a drying effect which differs from the other method. His method requires a more precise technic, with more skilful adjustment of apparatus and it is generally more successful.

For destroying malignant growths thoroughness is imperative, otherwise the growth is stimulated and promptly recurs. It should therefore be absolutely destroyed at the first application.

DR. W. H. SCHMIDT, Atlantic City, N. J.: I find that in those conditions in which I have used desiccation, especially in surface growths, or any accessible growths, the effect has been very good and the cosmetic result following the removal of these growths as near perfect as it was possible to obtain. It has also been my pleasure to follow several bladder cases in which the desiccation method has been employed. I think this phase of the subject has opened up a wonderful field because the subject of papilloma of the bladder is a very serious one. The fact that by means of this method you can destroy papilloma without the necessity of giving the patient a general anesthetic (and, as a rule, the patient who has had a papilloma of the bladder for any length of time is pretty weak) appeals to me as its strongest point. Furthermore, papilloma of the bladder has a marked tendency to recur and by the use of this method in case the papilloma does recur in a certain length of time it is a very simple matter to go into the bladder again with the cystoscope and destroy the recurrence. It will not necessitate a second surgical operation.

DR. C. L. GRABER, Cleveland: Has Dr. Clark ever used a local anesthetic, such as ethyl chlorid, before using this method in the destruction of warts and like growths? Also, what experience has he had in the use of the *x*-ray in palmar dermatitis and what result has he obtained?

DR. WILLIAM L. CLARK, Philadelphia: By application to a given area of very mild sparks preliminary to desiccation, the part becomes blanched and partial anesthesia ensues, usually sufficient to render the treatment bearable. In supersensitive individuals, local infiltration is to be recommended, except in cases of malignancy. I prefer a 1 per cent. solution of quinin and urea hydrochlorid to cocain, because it seems to be quite as effective, is non-toxic, less expensive and more prolonged in action. In ulcerated surfaces, the topical application of a 20 per cent. solution of quinin and urea is quite satisfactory. In two cases of extensive *x*-ray keratosis in which extreme sensitiveness existed, nitrous oxid gas was administered. My definition of the uses and limitations of desiccation is based on nearly 4,000 lesions treated personally by this method.

I quite agree with Dr. Pfahler that it is too early to assert that cold applied to the skin will give absolute immunity from *x*-ray dermatitis, but as there appears to be some tangible evidence that the *x*-ray may be applied with greater safety and efficiency by this method than by those now in use, co-workers should not hesitate cautiously to put it to the test. De Keating-Hart's observation that *x*-ray workers who possessed habitually cold hands had milder *x*-ray lesions than those with warm hands, and his personal statement to me of his belief in thermoradiotherapy based on experience with actual cases, led me to give it a trial. The fact seems worthy of note that during the past five months I have been able by this method to administer tremendous doses of the *x*-ray without burning or even tanning of the skin. The failure of massive *x*-ray dosage to produce burns may not be due to the temperature of the skin *per se*, but possibly to ischemia due to the application of cold, and conversely the greater efficiency of the ray may be due to the resulting hyperemia after the application of heat, these effects may possibly be brought about by some other means. This is an open question which will doubtless be determined later.

BACILLARY DYSENTERY

A CONTRIBUTION TO THE STUDY OF THE EPIDEMIOLOGY*

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Under the direction of Dr. Samuel G. Dixon, commissioner of health of Pennsylvania, I have had an opportunity to study the infections by members of the typhocolon group, and with his permission the results are now presented as a preliminary report.

The bacilli classified in this group of microorganisms possess such great differences in pathogenic characteristics and so many points of similarity in morphology and biology that infections by members of the group often present difficulties in establishing an individual clinical as well as an epidemiologic diagnosis.

It is especially desirable in this paper to discuss, in their epidemiologic relations, infections by members of the group giving rise to dysentery as the chief clinical characteristic, and the relation of outbreaks of dysentery to typhoid fever.

The work of Shiga and all who have since studied the dysentery bacilli has led to the etiologic division of infections by these microorganisms into two forms, bacillary and amebic dysentery; there is reason to add to this classification the form caused by the presence in the intestinal tract of the *Balantidium coli*, namely, balantidic dysentery. The last two forms will not be discussed in this paper.

In Pennsylvania, for the purpose of supervision and control, all forms are required by law to be reported to the health authorities under the term "epidemic dysentery." In only seven states and territories, California, Louisiana, New Jersey, Pennsylvania, Texas, Hawaii and Porto Rico, has an attempt been made to control the spread of this disease. The actual reporting and supervision of cases of dysentery except of the amebic type, however, so far as I have received information, is not practiced in any health jurisdiction of America. Under the jurisdiction of Hawaii and under the direction of the federal government in the Panama Canal Zone and the Philippine Islands, amebic dysentery is required to be reported and placed under certain quarantine regulations. In Pennsylvania, since the organization of the State Department of Health in 1905, there have been nine epidemics which were sufficiently large to investigate because the attention of the department was directed to them by reason of the mortality or of the association with typhoid fever, or because of the relation of sewage from the affected district to the public waters of the commonwealth.

Studies of outbreaks of proved water-borne disease in Pennsylvania have demonstrated the prevalence of acute bacillary dysentery and in many instances its relation to typhoid fever.

HISTORICAL

In Johnsonburg, Elk County, with a population of 4,200, during August, 1905, there was an epidemic of dysentery, the extent of which could not be learned (but

* Read in the Section on Preventive Medicine and Public Health of the American Medical Association, at the Sixty-Third Annual Session, held at Atlantic City, June, 1912.

* Because of lack of space, this article is abbreviated in THE JOURNAL by the omission of the charts. The complete article appears in the Transactions of the Section and in the author's reprints.

which was admitted to be very large), about ten days prior to the development of twenty-nine cases of typhoid fever as diagnosed clinically. There was no mortality during the outbreak of dysentery, but five of the typhoid fever patients died, a mortality of 17.2 per cent. The local diagnosis was "dysentery," but apparently it had no significance to the local health authorities. No bacteriologic analyses were made except that the water-supply was shown to be polluted with sewage organisms, the source being evidently from a lumber camp located on the banks of one of the streams supplying the borough with water and containing twenty-two men who had suffered with "bowel complaint."

In Warren, Warren County, with a population of about 10,000 at the time, an epidemic of "intestinal disorder" which is shown to have been water-borne, occurred during April, 1906, at which time 406 cases developed, not violent enough in character to require medical attendance. During the same year, between the dates of December 7 and 12, there occurred an estimated number of about 1,800, 600 persons being taken ill during one day, with the local diagnosis of "gastro-enteritis resembling mild ptomain or arsenical poisoning," the general features of which were sudden severe cramps in the abdomen followed by diarrhea, vomiting and great weakness. A few patients had high temperature followed by syncope. The excreta were watery and brownish. The duration of the illness was from three to six hours in the great majority of cases, followed by recovery. Others were more severely ill for thirty-six hours or longer. The laboratory examinations showed the water to be polluted with sewage organisms. The examination of the feces showed the prevailing microorganism to be a Gram-negative rod, apparently a bacterium, with characteristics which were common to *Bacillus aerogenes capsulatus* and hog cholera. It was negative to guinea-pigs. No organism suggestive of typhoid bacillus or cholera vibrio was discovered in water or feces. This outbreak was not followed by any known cases of typhoid fever.

In Kittanning, Armstrong County, with a population of 4,500, there occurred in January, 1907, a sudden and wide-spread outbreak of gastro-intestinal disorder which varied in severity from cases of simple diarrhea to cases presenting the symptom-complex of dysentery. It was shown that transient visitors to the town were particularly susceptible. The general features were sudden onset, accompanied by vomiting, purging and profound prostration. Other cases simulated influenza of the so-called abdominal type. In a certain number of cases there was severe rigor followed by temperature of the remittent type, general muscular pains, bronchitis and marked malaise. Many of the cases simulated typhoid fever, but as they improved on or about the tenth day the diagnosis of typhoid fever was not made. The outbreak followed immediately after certain changes in the public water-supply during the first week in December, and December 26, the first one of fifty-one cases of typhoid fever was reported to the local board of health.

At Mount Gretna, Lebanon County, in a military camp, during July, 1909, there was an outbreak of dysentery which was followed within one or two weeks by an unstated number of cases of typhoid fever. It was shown to be a water-borne infection. There was no bacteriologic analysis.

In that portion of Allegheny County in which 18,000 persons are supplied with water by the Ohio Valley Water Company there occurred during January, 1909, a dysenterial disease, the local diagnosis of which was "gastro-enteritis." The prevailing symptoms were abdominal pains followed by vomiting, diarrhea, lassitude and copious and watery excreta, lasting for a period of from three to seven days. An actual census of the cases showed that 2,887 persons, or nearly 16 per cent. of the total population, were ill. Analysis of the public water-supply showed the presence of sewage organisms, and three weeks from the date of onset of the first cases of dysentery there developed sixty-three cases of typhoid fever. The mortality was six, or about 10 per cent.

In Erie, Erie County, with a population of 66,525, there occurred during December, 1910, and January, 1911, two outbreaks, the local name for which was "winter cholera." These followed unusually severe northeast gales on Lake Erie, from which the water for the city supply is taken. The public supply became unusually turbid shortly after December 1 and almost immediately afterward there was a marked outbreak of acute enteritis appearing in all parts of the city, which by many physicians was called "intestinal grip." Clinically the disease, according to Dr. J. W. Wright, county medical inspector for the State Department of Health, and city health officer, was as follows: sudden onset with slight constitutional disturbance but characterized by severe abdominal pain, and followed in a few hours by frequent, profuse, watery stools; the discharges were offensive and accompanied by much flatus.

In the more severe form there was a moderate rise in temperature, all of the symptoms being more aggravated, and in some instances accompanied by intestinal hemorrhages. In mild cases the patients recovered within two or three days but cases of the more severe form lasted from ten days to two weeks and frequently were marked by relapse before complete recovery. Cases presenting these symptoms were first observed about December 10, the acme of the outbreak lasting about three days, on or about December 15. Various estimates have been made as to the total number of cases and it is generally agreed that there were probably 20,000 cases in this one outbreak. Typhoid fever, which had been practically endemic in Erie, immediately increased in the number of reported cases, the height of the outbreak occurring December 25, as indicated by the dates of onset. The number continued relatively great up to Jan. 10, 1911. Following the same storm history and tidal history of the lake waters, during the early part of January there occurred a second outbreak of dysentery of the same type, during which, however, a lesser number, probably 10,000 persons, became ill. Following this outbreak of dysentery there occurred another outbreak of typhoid fever, the height reaching its greatest point about February 1, and slowly subsiding until measures were instituted by the State Department of Health under the direction of Dr. Samuel G. Dixon.

To recapitulate: There occurred in Erie during December, 1910, and January, 1911, an outbreak of dysentery with a conservative estimated number of 30,000 cases, each outbreak being followed within a period of ten days, as indicated by the height of the curve of onsets of those cases studied, by a total of 886 cases of typhoid fever and 126 deaths, or a mortality of 14 per cent. The percentage of deaths from the dysentery infection cannot be properly estimated.

In Chester, Delaware County, with a population of 38,537, there occurred during January, 1910, an outbreak of dysentery which was diagnosed locally as being "winter cholera" and was traced to the water-supply of

a manufacturing company employing 7,000 wage-earners. The total number of cases has not been correctly estimated but it was shown that the absentees between January 3 and January 25, because of dysentery, ranged from eighty-eight to 265 in a single day. No increase above the normal typhoid fever rate for Chester followed this outbreak. There were no deaths.

Engineers from the State Department of Health discovered and immediately abated the source of the water pollution; a field laboratory was established by direction of the state commissioner of health and thirty-three suspected cultures were isolated from stools of the patients; twenty-nine proved to be *B. coli communis,* various forms of cocci and a few *B. aerogenes.* One of the remaining four was *B. cuniculicida,* closely related to the swine plague group. The other three were found to belong to the colon bacillus group and hog cholera group and most closely resembled *B. poelsii* but differed somewhat in growth on milk and potato. They differed from the hog cholera bacillus in their action on milk and in their indol production, which was, however, very slight. They were called paracolon bacilli because of the sugar reaction and action on milk and slight indol reaction.

The three cultures were isolated from two stools of the sick, one case being well advanced and the other just past the height of the infection. The other cultures did not show any of these colonies, but one acute case, although showing none of these organisms in the stool, gave a positive serum reaction. The biologic characteristics noted are found in several of the meat-poisoning group but do not correspond exactly with any of the described forms. The bacterium was isolated from one case just past the height of the condition and one convalescent. It was agglutinated by the serum of one early case but was not agglutinated by the serum of the patients from whose stools it had been isolated. There is no reason to believe that the clinical course of the case giving the agglutinating serum is any different from the courses assumed by the other cases. Other samples of water were incubated and after thirty-six hours were fished for colonies resembling *B. dysenteriæ,* the paracolon bacillus and *Vibrio choleræ.* None were found. Larger numbers of *B. coli,* however, were found in the sediment of the drinking-supply as well as in the sediment of the raw river-supply. The organism recovered corresponds biologically to the bacillus of Pochl, recovered from patients in an epidemic of dysentery in Rotterdam.

During February of 1912, I was assigned to investigate the reported cases of "Asiatic cholera" in Iselin, Indiana County, which is an unorganized community with a population of 2,700. The outbreak was proved to be a water-borne infection, the spring source of which was polluted directly by the excrement of hogs and chickens and a more remote pollution by human excrement. The early cases were marked by an abrupt onset and propulsive, watery evacuation (intestinal hemorrhage occurring in one), with vomiting and abdominal pain. There were a few cases with elevated temperature, the major number having subnormal temperature with marked prostration. The first of these patients was seen on or about February 1, and as only a fraction of the total population obtained water from the infected source and as all who sickened were Polish or Hungarian in nativity, it was not proved, but was apparent, that the earliest cases were of a dysenterial type. Later, after February 10 or 11, fifty-three cases, in part typical cases of typhoid fever, in part simulating typhoid, developed.

During September of 1911, I was assigned to investigate an outbreak of dysentery in Bethlehem, Lehigh County, which has a population of 12,837. Acting under the authority of the act of assembly dated May 14, 1909, the physicians were required to report all cases under their care. This is the first time in Pennsylvania that dysentery has actually been reported during the course of an epidemic or otherwise.

A total of 408 cases was so reported and studied, though there was indisputable evidence that upward of 1,800 cases existed in the borough between the dates of August 1 and September 6. This outbreak of bacillary dysentery was followed by a total of eighty-eight cases of typhoid fever, the maximum number of cases being reported three weeks from the date of subsidence of the dysentery outbreak. The clinical features of the dysentery were abruptness of onset and the great variation in the course and character of the symptoms, as has been noted in certain previous outbreaks. The source of the infection, except to certain members of the local board of health, was not apparent to the residents of Bethlehem, and many persons ascribed it to temperature and other meteorologic changes.

Bethlehem's water-supply is obtained from springs, and the residents boast of having the second oldest water-works in the United States. The geologic formation is almost entirely limestone and the sewage in this very old community has been for years directed into crevices of the limestone formation. The spring is at the base of the hill and unquestionably receives some portion of the 100,000 gallons of water, plus the sewage which passes into these crevices during every day of the year.

The analysis of the water showed, in addition to the *B. coli communis,* the presence of the *B. alkaligenes, B. suicidus,* the *B. acidi lactici* and a form corresponding to the strain of the dysentery type described by Rosen. The blood of seven known cases of dysentery infection agglutinated the last-named microorganism in dilutions of 1:50, which was the only dilution employed, while reactions with the *B. poelsii,* paracolon bacillus, *B. dysenteriæ* (Shiga) and *B. enteritidis,* (bacillus of Gaertner) were negative when studied in the same dilutions. Blood from the same patients was studied in relation to *B. typhosus* and *B. paratyphosus* A and B, with negative results. The same organism was recovered later from the feces of two of the patients and corresponded in all of its biologic features with the microorganism which was recovered from the water-supply of the borough.

TYPES AND PATHOGENICITY OF ORGANISMS

There is no question as to the relation between organisms of the dysentery group and the diseases classified as acute dysentery. It is obvious, from the work of many investigators, that there are many types of dysentery bacilli and that each type may be the factor in an outbreak or apparently there may be mixed types, as noted by Gay, Duval, Hastings, Shiga, Park, Hiss, Russell, Whitmore and many others. The variations, both in the type of organism and in the clinical phenomena, have until recently made the diagnosis confusing. Recently it has been possible to classify the many strains belonging to this group, which have been isolated and carefully studied, into three distinct varieties of types. The type most frequently found in severe epidemics and the one which probably contributes to the highest mor-

tality is known as Type 1 and includes the Shiga organism and all strains which have similar biochemical properties. Types 2 and 3, as a rule, cause a much milder clinical course; both are biochemically more nearly like strains of the colon group than are members of Type 1.

The bacilli of Type 1 do not produce indol and do not ferment mannite, maltose or saccharose; they produce agglutinins specific for strains of their own type and but little for members of other types. Type 2 ferments mannite with the production of acid reaction but does not split maltose or saccharose in peptone solution or agar; it produces indol and also produces agglutinins specific for strains of its own type. Type 3 is nearest the colon group since it produces indol and actively ferments mannite and maltose but acts feebly on saccharose.

The organism isolated from feces in the Warren epidemic would seem to conform to Type 3 though the identification by cultural and other methods was not carried out in detail. Clinically, the course of the disease in all cases introduced by this microorganism was mild.

The type isolated from feces in the Chester epidemic would also seem to be identified with strains of Type 3 since its characteristics resembled closely the bacillus isolated by Poehl, which can properly be grouped as a paracolon organism. The organism recovered from both feces and water during the Bethlehem epidemic corresponds to Type 2, however, as shown by its biologic characteristics; indol was but feebly and inconstantly produced; dextrose and mannite were fermented with the production of an acid reaction; saccharose was not fermented and there was no gas production. The serums of patients from whom it was isolated and the serums of other patients suffering with the same clinical course agglutinated this organism in dilutions of 1:50 before the end of one hour and failed to agglutinate the *B. dysenteriæ* (Shiga) and the *B. poelsii* (isolated from feces in the Chester epidemic). Studies with immune serums of known strains were not made.

Park suggests restricting the name "dysentery" to infections by the Shiga type and "paradysentery" to all infections by forms which fall into the other two types, giving as reasons their greater similarity to the colon group, as indicated in indol production, greater range of carbohydrate activity, and also the fact that they give rise to a much milder clinical type of reaction. Were this suggestion followed it would be less confusing for the practical purposes of both study and control. The pathogenicity of the types here reported would, then, correspond to the paradysentery type as the course of cases of the major number of epidemics studied was mild, and as a result the mortality was very low; in those instances in which an organism was isolated and identified, it was shown to belong to Types 2 and 3.

SEASON AND AGE

Infections by Type 1 are said to prevail from early summer (June or July) to the end of October and practically to disappear during the winter months. In contrast, the epidemics studied in Pennsylvania show the following occurrence:

Warren, Warren County	April
Kittanning, Armstrong County	January
Ohio Valley	January
Erie, Erie County	December and January
Chester, Delaware County	January
Iselin, Indiana County	February

The Johnsonburg, Elk County, epidemic, however, occurred during August; the Mount Gretna, Lebanon County, epidemic during July, and the Bethlehem, Northampton County, epidemic during September. It was possible to study the relation of the temperature range and the daily precipitation in relation to the dates of onset of the 408 cases in Bethlehem. Since two-thirds of these water-borne epidemics occurred during the winter or early spring months and a total of nine epidemics occurred during seven different months of the year, it would seem that there is no particular season for its appearance but that an outbreak of this disease depends on the association of an unprotected water-supply and the possibilities of sewage pollution; among other evident factors controlling the latter an unusual precipitation is of some importance. There is, however, some reason to believe that infections by members of Type 1 are more common during the summer months. It has been stated that young persons, particularly those between 20 and 30, are unusually susceptible. For this reason a tabulation of the cases occurring in Bethlehem with reference to age periods is introduced. It will be noted that practically no age period from the first to the seventieth year was spared and that while there is an apparent partial immunity beginning with the sixtieth year, it should be recalled that the proportional number of persons over this age is less in number than for younger age periods.

Age Period.	No. of Cases.
0 to 4	60
5 to 9	29
10 to 14	20
15 to 19	31
20 to 24	47
25 to 29	27
30 to 34	29
35 to 39	20
40 to 44	31
45 to 49	15
50 to 54	21
55 to 59	22
60 to 64	18
65 to 69	12
70 and over	19
Information refused	7
	408
Males	193
Females	215
	408

MORTALITY

As has been shown by the study of infections by Type 1 there is a very wide range of mortality; that given by Shiga for Japan is from 22 to 26 per cent.; by Kruse for Germany, 10 per cent.; by Rosenthal for Russia, 12 to 17 per cent.; and Manson states that while Europeans in India suffer a mortality of 3 to 22 per cent., the native loss is 36 to 40 per cent. Park, in studying infections by mixed types in and about New York City, found that there was a mortality of 6 per cent; about 50 per cent. of the cases studied by him showed the *B. dysenteriæ* (Shiga-Kruse) in the feces. The clinical course was severe and the mortality high as contrasted with the other cases studied. In the feces of the other 50 per cent. various strains of the other two types were found. No age periods are mentioned by him. The mortality of epidemic dysentery in Pennsylvania has not been studied except in the instance of Bethlehem, where but four cases, or less than 0.4 per cent., resulted fatally. It should again be recalled that the Bethlehem epidemic was in all probability caused by a strain belonging to Type 2.

The average annual death-rate in the registration area of America for the years 1906 to 1910, inclusive,

was 595,734. Of these 496 are credited to cholera nostras, 2,947 to dysentery, 35,226 to diarrhea and enteritis under 2 years of age and 7,110 to diarrhea and enteritis over 2 years of age. From these figures it is obviously impossible to estimate the number of deaths from acute bacillary dysentery since there are included under the four titles cases of bacillary dysentery diagnosed as "summer diarrhea," acute colitis, acute enteritis, the various chronic inflammatory conditions of the gastro-intestinal mucosa and also acute and chronic conditions not bacillary in origin. These will be referred to in a separate contribution.

Unquestionably epidemics differ widely in severity, depending on the type of microorganism, its casual relation to other pathogenic forms, and, to some extent, the degree of sewage pollution.

EPIDEMIOLOGY

While cultural characteristics, agglutination reactions and bacteriologic phenomena make it possible to distinguish sharply between types, the process resulting from the infection by any type is a pathologic one and becomes the problem of the epidemiologist. The most important source of infection, as in typhoid fever, is the patient himself, and the care of the dejecta constitutes the most important single item of sanitation.

The disease is endemic in a large portion of the world and each case may be the cause of a widely distributed outbreak. That at Warren followed an infection of the borough water-supply by sewage from a lumber camp where cases of "bowel complaint" existed and the sewage was deposited on the banks of the stream. At Erie and Bethlehem the infection was unquestionably caused by microorganisms from the sewage of the residents of each city. The occurrence of cases secondary to large numbers of sporadic cases cannot be estimated.

There is no doubt that many persons are infected by contaminated food, particularly meat, milk and ice-cream; contact infection, especially in epidemics, occurs through the medium of infected clothing, infected food and the ubiquitous fly. In addition, the organisms belonging to this group have been found in the feces of healthy persons and in the intestinal mucosa of individuals who had no other evidence of dysentery; the possibility of infection by carriers is so demonstrated.

RELATION TO TYPHOID FEVER

The relation of bacillary dysentery to typhoid fever depends entirely on the casual association of the two forms of microorganisms in the sewage-polluted source of infection.

The simultaneous appearance, however, of a number of cases or the presence of a spontaneous epidemic of acute dysentery should be the indication for immediate investigation and abatement of the source of infection. If typhoid bacilli should be associated it will be the means of lessening the number of cases. Those already infected will show an onset some two weeks after the beginning of the subsidence of the dysentery outbreak.

The average period between beginning of subsidence of reported cases of bacillary dysentery and the onsets of the typhoid fever cases is fourteen days, the least recorded period being ten days, the greatest, twenty-one days. In the nine epidemics of dysentery studied there is a record of at least 55,000 cases of acute bacillary dysentery in a total population of 152,000; that is, 36 per cent of the population suffered from that one preventable disease. In five instances, or in 55 per cent., notable increases in the number of cases of typhoid fever developed, 1,320 having occurred immediately after. The mortality for the latter was 14.6 per cent.

CONCLUSIONS

The following conclusions seem to be warranted by this study:

1. Bacillary dysentery should always be a reportable disease.
2. Sufficient power should be given to the health authorities to investigate and abate any suspected source.
3. Less confusion to the general practitioner results from a nomenclature broad enough to include all types of the causative organism.
4. While there is some warrant for the terms "dysentery" and "paradysentery," the more general one of "bacillary dysentery," in so far as preventive medicine is concerned, simplifies the problem both of diagnosis and of sanitary supervision.
5. There is apparently a notable lack of recognition of the etiology and probably of the pathology of cases infected by members of the dysentery group, resulting in a longer continuance of the infecting source and a higher mortality; this is evidenced in the varied diagnoses such as "diarrhea," "winter cholera," "intestinal grip," "grip," "gastric fever," "intestinal disorder" and many others.
6. Dependent on the casual association of the *B. typhosus,* outbreaks of bacillary dysentery may be followed within ten to twenty-one days by a marked increase in the number of typhoid fever cases. This occurred in five out of nine instances in Pennsylvania and may serve as a warning of the presence of the more serious infection; the immediate abatement of the sources would probably decrease the morbidity and mortality due to typhoid fever.
7. When it is recalled that the major number of cases of bacillary dysentery are mild in form, being caused by Types 2 and 3, that sporadic cases probably exceed the total numbers occurring in epidemics; that sporadic cases probably account for the large proportion of deaths under 2 years of age accounted for statistically as cholera nostras, dysentery and diarrhea and enteritis; that the disease is reportable in only seven states and territories; and that in the latter the law is not enforced, the only conclusion is that we have no definite collective information about the morbidity and mortality of the infection which properly should be called bacillary dysentery.

ABSTRACT OF DISCUSSION

DR. C. HAMPSON JONES, Baltimore: In our municipal laboratory we examine for the *Bacillus typhosus,* as well as for the paratyphoids. There is a regular process of examination of every specimen that comes in.

DR. RICHARD COLE NEWTON, Montclair, N. J.: I could not help but take particular heed to what Dr. Hunt said about Bethlehem, as Bethlehem has been infecting the city of Trenton. We have been getting 100 cases there at a time on the Delaware River, and it is supposed that they all start from Bethlehem.

DR. A. PARKER HITCHENS, Glenolden, Pa.: Some time ago I had occasion to look up the literature on paratyphoid fever. I was rather astonished to learn how very prevalent it is. Attention has been called to this fact a number of times but general interest has not yet been aroused. Wells stated that about 10 per cent of the cases in Chicago diagnosed as typhoid fever are actually paratyphoid. Kolle makes the same estimate for Germany, while Boycott found in London from 3 to 3.5 per cent. An epidemic of paratyphoid infection in this country was reported by Lyons in the *New Orleans Medical Journal*

about, I think, in 1910. The bacillus responsible for the epidemic was of the A type. The usual impression is that paratyphoid B infections are much more commonly diagnosed as typhoid fever than are infections by the paratyphoid A bacillus. Lyons believes that paratyphoid A is the more frequent offender, in New Orleans, at least.

He was the first to suggest the use of a mixed typhoid vaccine. If paratyphoid infection is anything like so prevalent as has been stated—10 per cent. of the conditions diagnosed as typhoid fever—even though the mortality-rate be not high, not more than 1, or 2, or 3 per cent. ordinarily, the economic loss due to the illness and enforced idleness is so great that there would seem to be no reason why we should not add the paratyphoids to the regular typhoid vaccine, as mentioned by Dr. Russell.

A short time ago I started an investigation to find out what bacteria are concerned in the infection in typhoid fever after ulceration has developed. I feel that the treatment of typhoid fever by a single vaccine, that is, a vaccine composed of typhoid bacilli alone, is not adequate at this stage. Once in a while therapeutic inoculation with typhoid vaccine is followed by remarkably brilliant results. We feel that at such times, in such cases, the infection is a pure typhoid infection. In other cases the typhoid vaccine seems to do no good at all; and these things happen so frequently that nobody can predict a favorable result. After ulcerations have developed, that is, after the second or third week, when typhoid patients usually reach the hospitals, the disease is not, bacteriologically speaking, a typhoid infection, but is a mixed infection and if one could prepare a suitable mixed vaccine, positive results from therapeutic inoculation might be more frequent.

DR. C. J. HUNT, Harrisburg, Pa.: I understand that in the laboratory in Baltimore the agglutination reaction has been worked out in every case of typhoid fever with *Bacillus typhosus* and all other group members. I should like to be informed whether I am correct in that understanding.

Under the direction of Dr. Dixon I made a tabulated list of the cases of typhoid fever occurring in the Lehigh Valley District, in order that they might know from where some of the typhoid organisms originated which were found in the Delaware. There is no doubt that much sewage escaped disinfection. The German statistics showing a mortality of 10 per cent. are probably more nearly correct, as the details worked out in establishing a diagnosis were studied more carefully. One point which seems confusing in the reports of German investigators is the apparent failure to differentiate between *Bacillus typhosus* B and the Gaertner bacillus. There is no sharp differentiation between paratyphosus B fever and meat-poisoning cases, from which the Gaertner bacillus has been isolated. It is my hope to make a report of these infections later.

The frequent occurrence of paratyphosus A infection has already been noted and is a matter of comment among those working in this field, particularly as to the differentiation between *Bacillus paratyphosus* A and *Bacillus typhosus*. There is apparently a group agglutination for these two microorganisms, a factor which can be determined only by observations on the titer limit in every case. My conclusions in the Coatesville epidemic were that we were dealing essentially with A infection, though I did not advance it as a portion of my paper. Had more extended observations been made there would be some justification for making a definite statement with reference to it. In South Bethlehem during the epidemic of *Bacillus typhosus* infection, I had an opportunity, through the treasurer of the Bethlehem Steel Works, acting for Mr. Schwab, to immunize about 10,000 employees. The result of the first day's work in that borough by ten census-takers showed that the outbreak was already abated and the enforced vaccination would have been scarcely justifiable. The use of vaccine in mixed infection is one I hope to work out in Pennsylvania. I shall, I think, have an opportunity in connection with further studies on this group of microorganisms. The latter will include studies on the titer limit, saturation and bactericidal properties.

THE ERADICATION OF THE SOCIAL DISEASES IN LARGE CITIES *

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No more time need be spent in discussing the possibility or the impossibility of eradicating the contagious social diseases, syphilis and gonococcus infection than in relating their ubiquity or their influence on all classes of society. Suffice it to say that rich and poor, intelligent and stupid, moral, immoral and unmoral, innocent and guilty, are paying the price of centuries of an ignorant, ill-considered false modesty in terms of morbidity and mortality that probably surpass the sum of all other contagious influences combined. If a computation were made of the acute venereal infections, their complications and active sequelæ, the brain and cord lesions, the insanities and idiocies, the inherited and acquired deformities and destructive lesions, the partially and totally blind, the abortions and stillbirths, the operations on the abdomens of innocent as well as of guilty women, the male and female sterility, the army of infant deaths, the apoplexies, the lowered vitalities of those not manifestly diseased, the moral bias and weakness, and the degeneracies of mind and heart directly or indirectly traceable to the so-called social diseases, there would result a seriousness and perhaps a tendency to reflection throughout humankind that would forecast at least a profound upheaval. The physical results form only the beginning of the influence of the social diseases on the world at large. The broken homes, the divorces, the desertions, the suicides, the incapacity for work, the wages lost, the hospitals and asylums rendered necessary, the cost of treatment, form only a few of the points at which the diseases of immorality impinge on both the innocent and the guilty portions of society. It seems incredible that up to the present syphilis and gonococcus infection are, officially speaking, non-existent, and that as far as the national and to a great extent the municipal authorities are concerned are deserving only of contempt or complete disregard. In the Army and the Navy alone are they officially recognized by the national government as diseases. The horde of immigrants that enter this country every year is examined for every infection save these two. The accurate and actual cause is placed on the death-certificate, the country over, in every instance save of these two diseases.

There is before us, therefore, a task to which society at large, and especially the medical portion of it, must straightway address itself. The fact that the problem ramifies in and out through animal passion and private and public immorality renders it more difficult, to be sure, but none the less insistent, and none the less finally soluble. Small-pox once appeared hopelessly and permanently beyond control; tuberculosis was only recently regarded with complacent resignation. The social diseases await the same sharp awakening of a people that have been too long asleep, and the application of measures that are within our grasp in spite of all pessimism to the contrary.

AN EDUCATED PUBLIC

In the first place, and absolutely essential to the success of any attempt at controlling influences so insidious

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